Air Quality in Alberta
October to December, 2002

Alberta Environment continuously monitors air quality in Edmonton (three stations), Calgary (three stations), Red Deer, Fort Saskatchewan and Beaverlodge (35 km west-northwest of Grande Prairie). Air pollutants monitored at Alberta Environment stations include carbon monoxide, dust and smoke, oxides of nitrogen, ozone, total hydrocarbons, hydrogen sulphide, sulphur dioxide, ammonia and particulates (PM_{10} and $PM_{2.5}$). The Index of the Quality of the Air (IQUA) is calculated at the Edmonton, Calgary, Red Deer and Fort Saskatchewan stations. The IQUA converts air pollutant concentrations into ***Good***, ***Fair***, ***Poor*** and ***Very Poor*** air quality ratings.

Highlights

- *Good* **air quality was reported over 99 per cent of the time at all Alberta Environment monitoring stations in the fourth quarter of 2002.** *Good* air quality occurred 100 per cent of the time at the Edmonton Central, Calgary Northwest, Edmonton East and Red Deer monitoring stations. *Good* air quality is the best possible rating and means that there are no known harmful effects to human or environmental health. *Fair* air quality was reported the remainder of the time at Alberta Environment monitoring stations. *Fair* air quality is in the acceptable range and means that there is adequate protection against harmful effects to human or environmental health.

- *Poor* **and** *Very Poor* **air quality was not measured at any Alberta monitoring stations in the fourth quarter of 2002.** *Poor* air quality is rare in Alberta. During the previous ten years (1992 to 2001) in the fourth quarter, only twelve hours of *Poor* air quality were recorded in Calgary and only two hours of *Poor* air quality were recorded in Edmonton. *Very Poor* air quality did not occurred at any Alberta monitoring stations in the fourth quarter over the previous ten years (1992 to 2001).

- **Air quality guidelines were exceeded on two occasions at Alberta monitoring stations from October to December 2002.** $PM_{2.5}$ levels higher than the Canada-wide Standard (CWS) benchmark concentration of 30µg/m^3 (micrograms per cubic metre), for a 24-hour averaging time,

For current air quality conditions call ***1-877-247-7333*** or go to Alberta Environment's website at www.gov.ab.ca/env, click on "Air", "Air Quality Monitoring" and "Current Air Quality".

Alberta
ENVIRONMENT

Internet:
www3.gov.ab.ca/env/airqual/quart.html
ISBN No. 0-7785-3148-1 (Printed Edition)
ISBN No. 0-7785-3149-x (On-Line Edition)
Pub No. T/732 (Printed, On-Line Edition)

were detected at the Edmonton Northwest station on December 20th (31.5 µg/m^3). The 8-hour guideline for carbon monoxide (5 ppm - parts per million) was exceeded at Edmonton Northwest between 4 p.m. and midnight on December 19th (5.7 ppm). Higher particulate and carbon monoxide levels may be due to traffic near the station.

- **Dust and smoke, nitrogen dioxide, ozone and sulphur dioxide levels were well below Alberta's air quality guidelines from October to December of 2002.** The one-hour hydrogen sulphide guideline was not exceeded at Alberta Environment stations in the fourth quarter of 2002. However, on two occasions, hydrogen sulphide levels reached 0.010 ppm (equal to the one-hour guideline) at the Calgary East station, on November 12 between 2 a.m. and 3 a.m. and on December 27 between 11 a.m. and noon. These levels were caused by emissions from the near-by sewage treatment facility. The one-hour guideline for hydrogen sulphide (0.010 ppm) is based on odour perception.

- **Pollutants emitted by vehicles continued to show a downward trend in the fourth quarter of 2002.** Carbon monoxide levels were 12 to 38 per cent lower than the average for the previous ten years (1992 to 2001) in Edmonton and Calgary. Lower carbon monoxide levels are primarily due to better emission control systems on newer vehicles. Dust and smoke values were 8 to 33 per cent lower than the ten-year average in Edmonton and 8 per cent lower at Calgary Central. However, dust and smoke levels remained the same at the Calgary East station and increased by 17 per cent at the Calgary Northwest station compared to the 10-year average. Higher dust and smoke levels at the Calgary Northwest station may be due to increased traffic near the station. The major urban sources of carbon monoxide, nitrogen dioxide and dust and smoke are automobiles. Improvements in air quality at urban locations are primarily due to better emission controls for newer vehicles.

Number of Times Air Quality Guidelines were Exceeded - October to December, 2002

Station	Carbon Monoxide		Dust and Smoke	Hydrogen Sulphide		Nitrogen Dioxide		Ozone	Particulate	Sulphur Dioxide		Ammonia
	1-hour	8-hour	monthly	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour $PM_{2.5}$	1-hour	24-hour	1-hour
Edmonton Central	0	0	0	n/a	n/a	0	0	0	0	n/a	n/a	na
Edmonton Northwest	0	1	0	n/a	n/a	0	0	0	1	n/a	n/a	na
Edmonton East	0	0	0	0	0	0	0	0	0	0	0	na
Calgary Central	0	0	0	n/a	n/a	0	0	0	0	n/a	n/a	na
Calgary Northwest	0	0	0	n/a	n/a	0	0	0	0	n/a	n/a	na
Calgary East	0	0	0	0	0	0	0	0	0	0	0	na
Red Deer	0	0	n/a	0	0	0	0	0	0	0	0	na
Fort Saskatchewan	0	0	0	0	0	0	0	0	0	0	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	na	0	0	na
Guideline	13 ppm	5 ppm	90% of values< 1 COH unit	0.01 ppm	0.003 ppm	0.212 ppm	0.106 ppm	0.082 ppm	30 µg/m^3 *	0.172 ppm	0.057 ppm	2.0 ppm

na Parameter not monitored at this location.

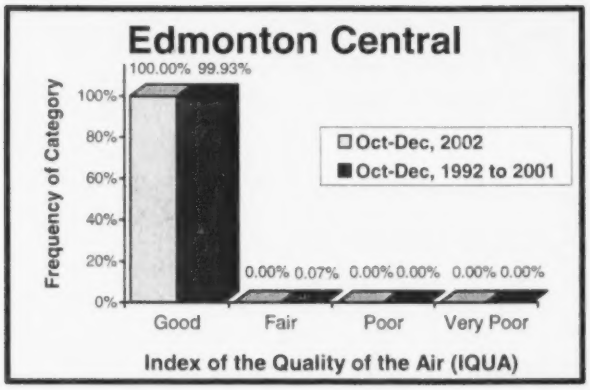
* The level & form of the achievement statistic specified the $PM_{2.5}$ Canada-wide Standard is 30 µg/m^3, for 24-hour averaging time, based on the 98th percentile annual value, averaged over 3 consecutive years. (Canadian Council of Ministers of the Environment, 2001. Guidance Document on Achievement Determination: Canada-wide Standards for Particulate Matter (PM) and Ozone.)

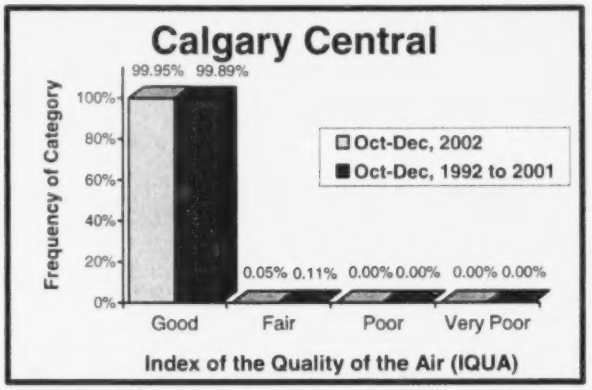
The Index of the Quality of the Air

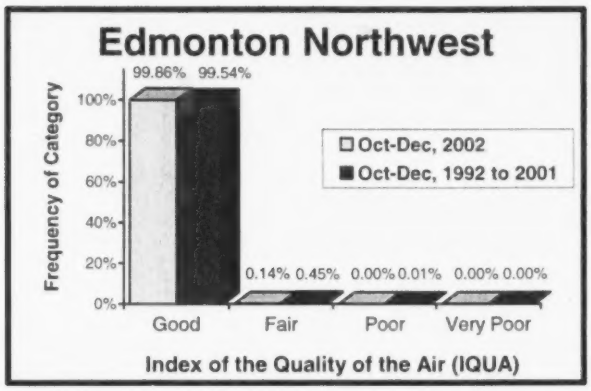
The index of the quality of the air (IQUA) provides the public with a meaningful measure of outdoor air quality. The IQUA is calculated every hour at all Edmonton, Calgary, Red Deer and Fort Saskatchewan monitoring stations. From this index, we can effectively rate air quality as Good, Fair, Poor or Very Poor. Air pollutants used to calculate the IQUA are carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide. Good, Fair, Poor and Very Poor air quality categories are directly related to guidelines under Alberta's *Environmental Protection and Enhancement Act*, and National Ambient Air Quality Objectives.

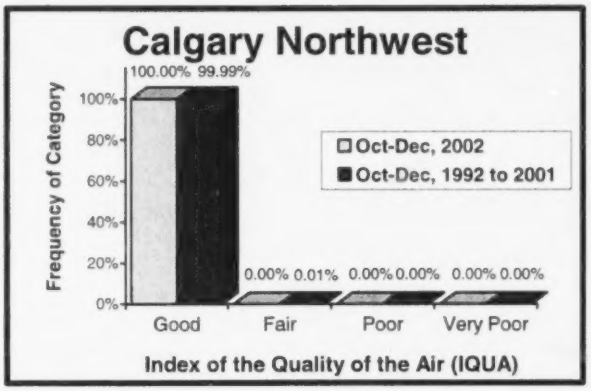
IQUA rating	Description
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
Poor	Tolerable range: not all aspects of human health or the environment are adequately protected from possible adverse effects. Long-term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
Very Poor	Intolerable range: in this range, continued high readings could pose a risk to public health.

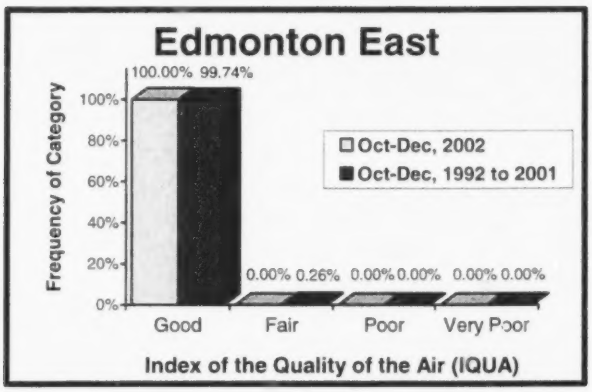
Source: Environment Canada. 1980. Guideline for a short-term air quality index. A report by the Federal-Provincial committee on Air Pollution.

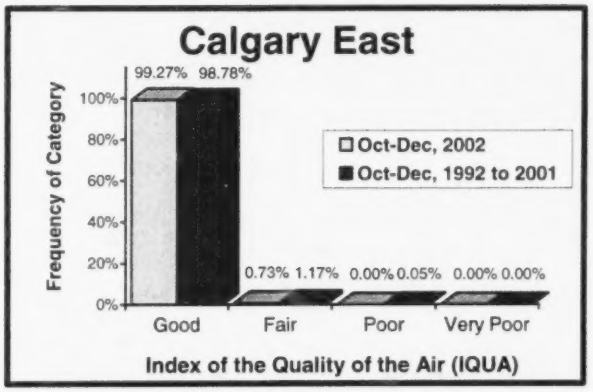

Edmonton Central
100.00% 99.93%
0.00% 0.07% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

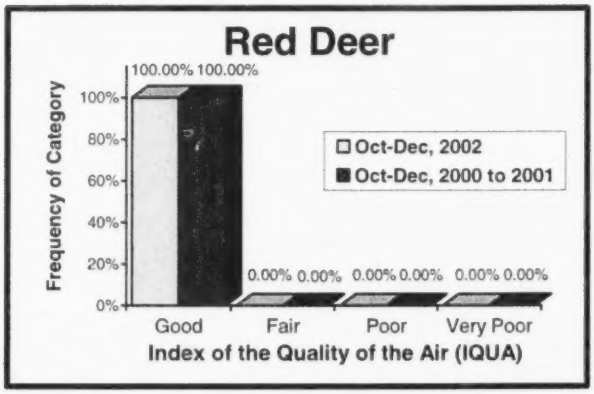

Calgary Central
99.95% 99.89%
0.05% 0.11% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

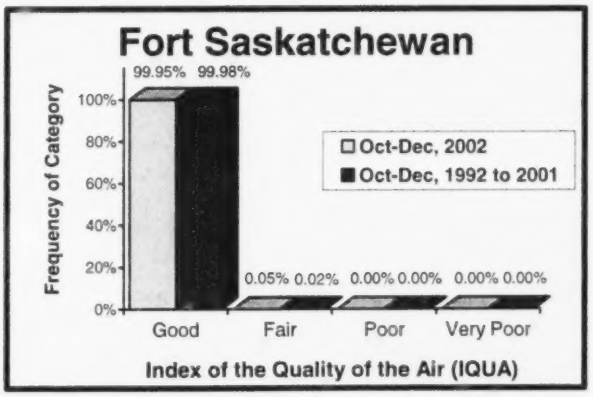

Edmonton Northwest
99.86% 99.54%
0.14% 0.45% 0.00% 0.01% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary Northwest
100.00% 99.99%
0.00% 0.01% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Edmonton East
100.00% 99.74%
0.00% 0.26% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Calgary East
99.27% 98.78%
0.73% 1.17% 0.00% 0.05% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Red Deer
100.00% 100.00%
0.00% 0.00% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 2000 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)


Fort Saskatchewan
99.95% 99.98%
0.05% 0.02% 0.00% 0.00% 0.00% 0.00%
Oct-Dec, 2002
Oct-Dec, 1992 to 2001
Frequency of Category
100%
80%
60%
40%
20%
0%
Good
Fair
Poor
Very Poor
Index of the Quality of the Air (IQUA)

Average Concentrations - October to December, 2002 [a]

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Red Deer [g]	Fort Saskatchewan	Beaverlodge [b]
		Central	Northwest	East	Central	Northwest	East			
Carbon Monoxide	Oct-Dec 2002	0.71	0.89	0.40	0.65	0.45	0.75	0.47	0.38	n/a
(ppm)	Oct-Dec 1992-2001	0.98	1.04	0.52	1.09	0.67	1.07	0.48	0.55	n/a
Dust and Smoke	Oct-Dec 2002	0.12	0.18	0.21	0.22	0.18	0.39	n/a	0.15	n/a
(COH unit)	Oct-Dec 1992-2001	0.19	0.27	0.25	0.25	0.15	0.39	n/a	0.16	n/a
Hydrogen Sulphide	Oct-Dec 2002	n/a	n/a	0.001	n/a	n/a	0.001	0.001	0.001	n/a
(ppm)	Oct-Dec 1992-2001	n/a	n/a	0.001	n/a	n/a	0.001	0.001	0.001	n/a
Nitrogen Dioxide	Oct-Dec 2002	0.027	0.030	0.022	0.030	0.021	0.030	0.017	0.017	0.006
(ppm)	Oct-Dec 1992-2001	0.028	0.027	0.022	0.032	0.021	0.030	0.018	0.017	0.005
Ozone	Oct-Dec 2002	0.008	0.011	0.011	0.010	0.016	0.010	0.010	0.013	0.019
(ppm)	Oct-Dec 1992-2001	0.010	0.010	0.014	0.008	0.015	0.009	0.011	0.015	0.023
Sulphur Dioxide	Oct-Dec 2002	n/a	n/a	0.002	n/a	n/a	0.003	0.000	0.001	0.000
(ppm)	Oct-Dec 1992-2001 [c]	n/a	n/a	0.003	n/a	n/a	0.004	0.001	0.002	0.001
Total Hydrocarbons	Oct-Dec 2002	2.26	2.07	2.46	2.13	2.04	2.25	2.40	1.96	n/a
(ppm)	Oct-Dec 1992-2001	2.36	2.27	2.41	2.24	2.14	2.33	2.51	2.10	n/a
Particulate	Oct-Dec 2002	n/a	23.3	n/a	21.5	n/a	n/a	n/a	n/a	n/a
(PM_{10} in $\mu g/m^3$)	Oct-Dec 1994-97 [d]	n/a	21.1	20.5	22.0	n/a	n/a	22.0	n/a	n/a
Particulate	Oct-Dec 2002	6.0	7.3	6.8	5.3	Insufficient Data	Insufficient Data	4.7	5.3	n/a
($PM_{2.5}$ in $\mu g/m^3$)	Oct-Dec 1998 [e,f]	8.0	11.5	9.0	9.0	4.6	8.0	6.9	7.8	n/a
Ammonia	Oct-Dec 2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.002	n/a
(ppm)	Oct-Dec 1992-2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.003	n/a

Maximum One-Hour Concentrations - October to December, 2002 [a]

Parameter	Edmonton Stations			Calgary Stations			Red Deer	Fort Saskatchewan	Beaverlodge	One-Hour Guideline
	Central	Northwest	East	Central	Northwest	East				
Carbon Monoxide (ppm)	5	10.1	3.1	5.3	4.6	5.8	3.6	2.9	n/a	**13.0**
Dust and Smoke (COH Unit)	1.2	2.4	1.7	2.1	1.9	2.9	n/a	2.2	n/a	**na**
Hydrogen Sulphide (ppm)	n/a	n/a	0.008	n/a	n/a	0.010	0.004	0.005	n/a	**0.010**
Nitrogen Dioxide (ppm)	0.097	0.138	0.069	0.070	0.074	0.095	0.047	0.051	0.025	**0.212**
Ozone (ppm)	0.040	0.050	0.044	0.042	0.050	0.049	0.041	0.047	0.041	**0.082**
Sulphur Dioxide (ppm)	n/a	n/a	0.035	n/a	n/a	0.014	0.004	0.026	0.006	**0.172**
Total Hydrocarbons (ppm)	6.1	4.4	14.9	3.4	3.1	4.5	6.3	6.1	n/a	**na**
Particulate (PM_{10} in $\mu g/m^3$)	n/a	207.3	n/a	146.8	n/a	n/a	n/a	n/a	n/a	**na**
Particulate ($PM_{2.5}$ in $\mu g/m^3$)	60.3	59.8	72.4	53.7	Insufficient Data	Insufficient Data	31.5	58.8	n/a	**na**
Ammonia (ppm)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.142	n/a	**2.0**

* Insufficient Data indicates data was available for less than 75% of time period

a All average and maximum values based on data collected from October to December.

b Monitoring at the Beaverlodge station began in November 1997.

c Sulphur dioxide monitoring began in February 1999 at the Beaverlodge station.

d PM_{10} monitoring began in January 1996 at the Calgary Central station and November 1993 at the Edmonton Northwest station.

e The PM_{10} monitor at the Edmonton East station was converted to $PM_{2.5}$ in August 2000. The PM_{10} monitor at the Red Deer station was converted to $PM_{2.5}$ in December 2000.

f $PM_{2.5}$ monitoring began in November 1997 at the Calgary Central station, July 1998 at the Edmonton Northwest station, October 2000 at the Edmonton Central station and November 2001 at the Fort Saskatchewan station.

g Monitoring at the Red Deer station began in December 1999.

na Parameter not monitored at this location or no one-hour guideline for parameter.